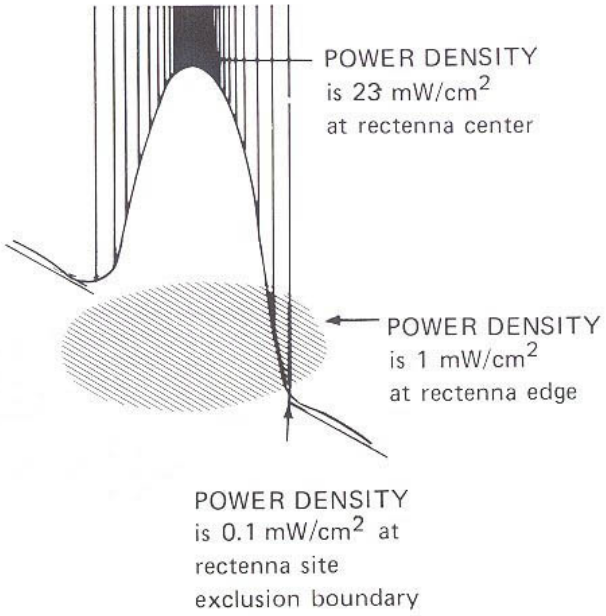
Plant Response to Microwave Energy

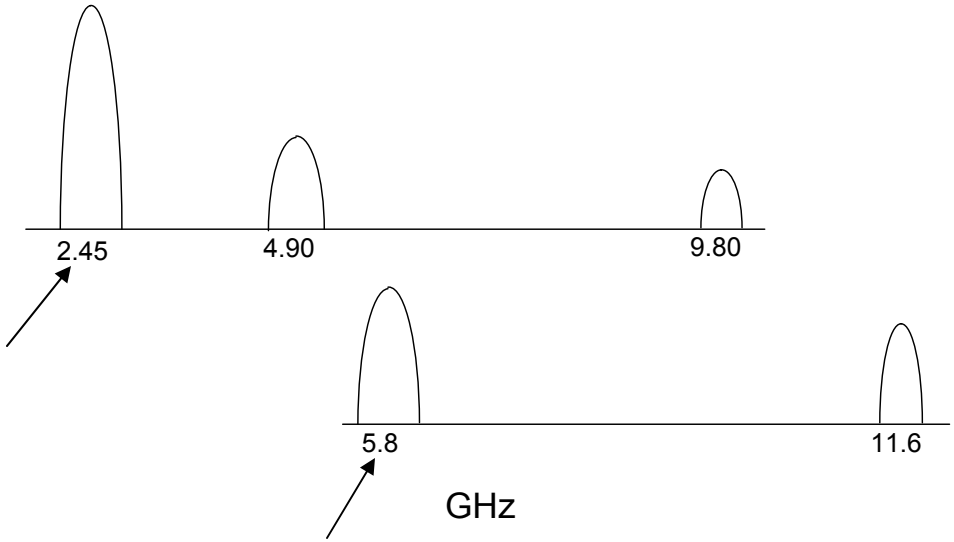
Dr. J. W. Skiles
Ecosystem Science and Technology Branch
Earth Science Division
NASA Ames Research Center

Expected Power Densities At & Near a Typical Rectenna

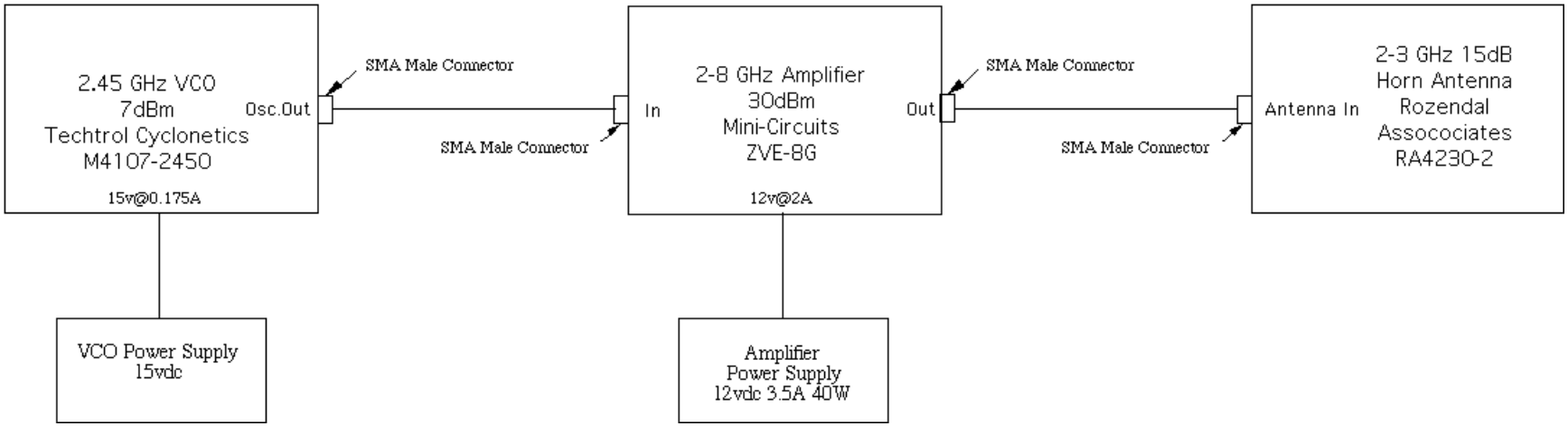


(Redrawn from Koomanoff, F. A. and C. E. Bloomquist. 1998.)

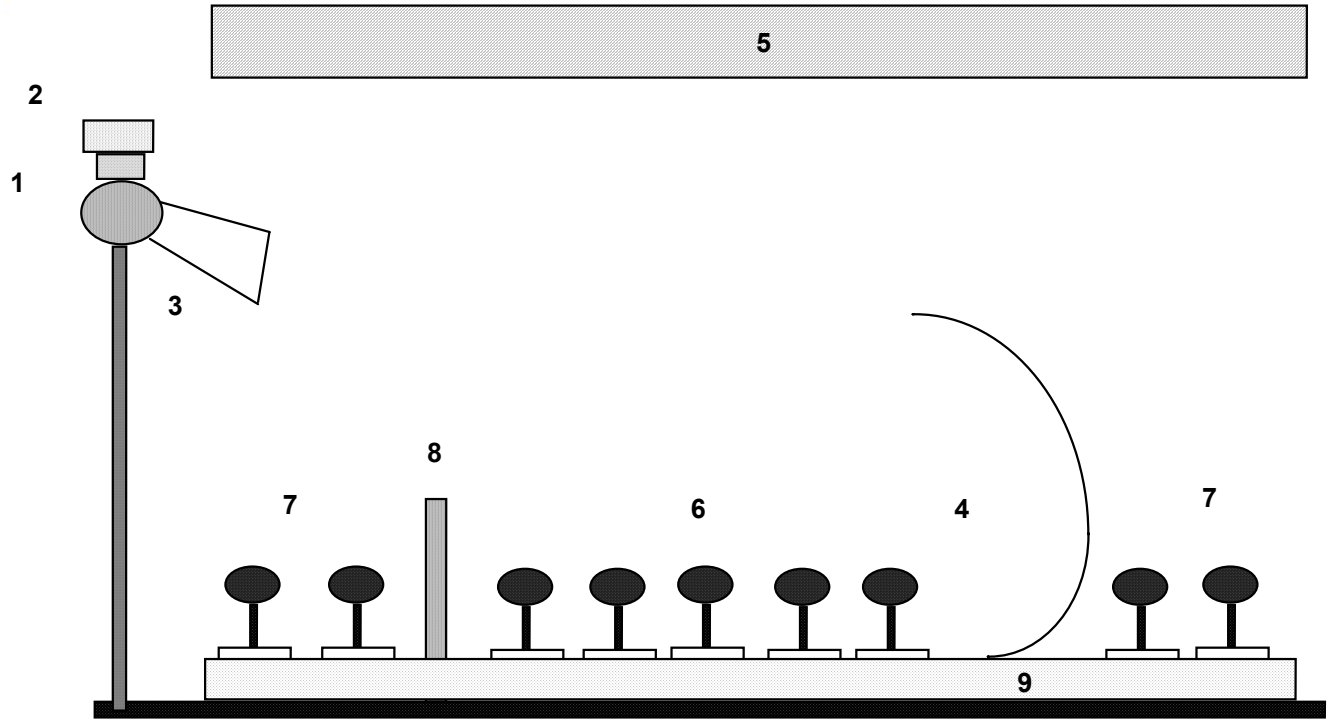
SSP Microwave Frequencies & Harmonics



Schematic of Microwave Generation Apparatus



Laboratory Microwave Exposure Schematic



1 Voltage Controlled Oscillator

2 MWR Amplifier

3 MWR Emitter Horn

4 Reflector

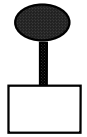
5 Light Source

6 Test Plants

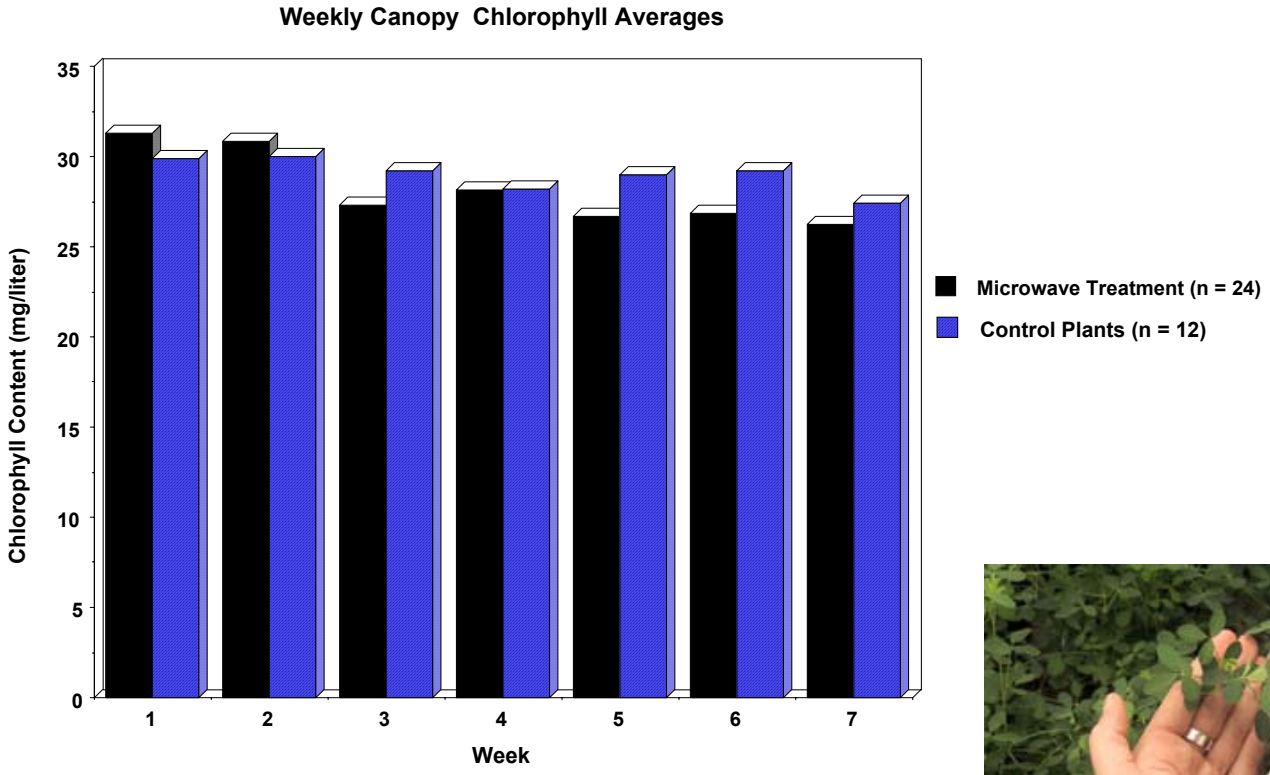
7 Control Plants

8 MWR Shield

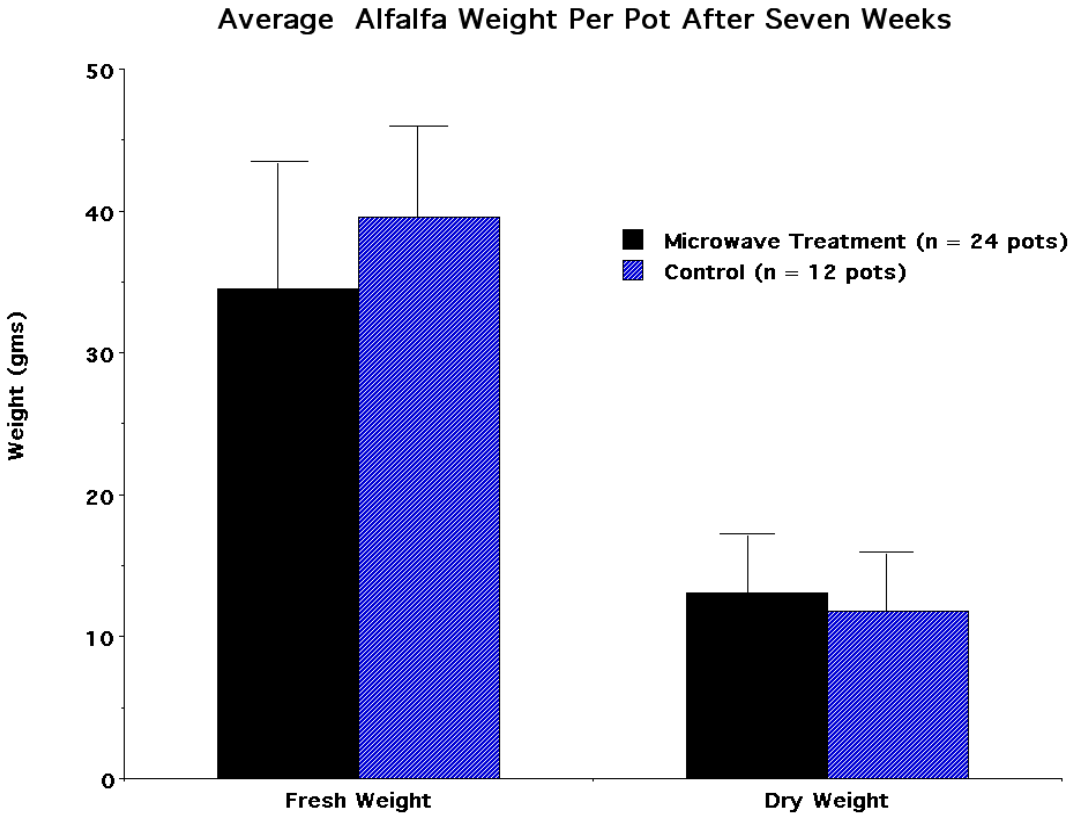
9 Tray



MWR Field Intensity Measurements



Taking Chlorophyll Measurements



View of Plant Canopy
(MWR Shield Removed for Photo)

- Internodal Elongation is a Function of Meristem Activity
- More and Longer Nodes Might Mean Meristem is Affected by MWR
- Internodal Distances Were Recorded Weekly for Both Control and Treatment
- Preliminary Analysis Shows Only Natural Variation of Internodal Distances Between the Two Plant Populations

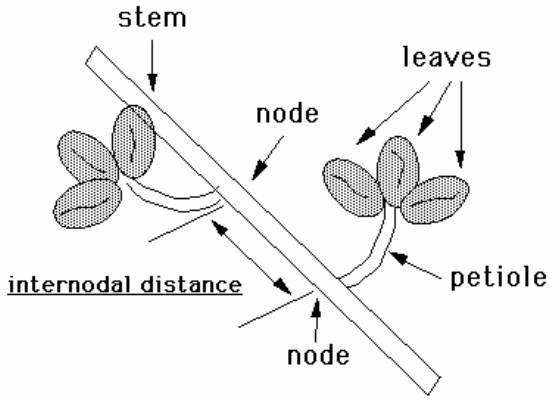
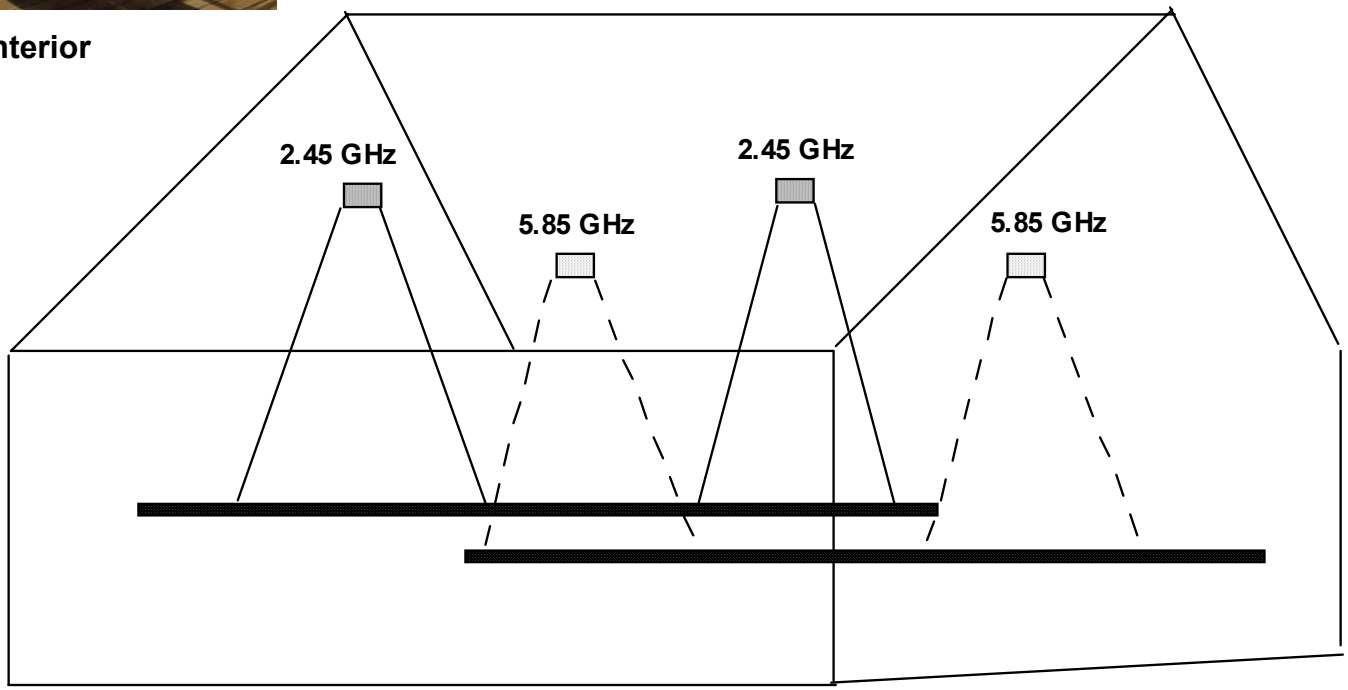


Illustration of Internodal Distance

Glasshouse Interior

Microwave Exposure
Glasshouse Experiment - IP

Two Frequencies
Two Replicates Each



Other Planned Experiments

* Alfalfa Grown from Seed, GH, @ 2.45. & 5.8
* Cereal Plants Mature and from Seed, Lab & GH, @ 2.45 & 5.8
* Arabadopsis sp. Mature and from Seed, Lab, @ 2.45
* Plants in Competition, Mature and from Seed, GH, @ 2.45 & 5.8

* Any or All of the Above w/
  - reduced water
  - reduced NPK
  - increased temperatures
  - combinations

* Seeds from Plants Grown Under MWR, GH, 2.45 & 5.8

GH = glasshouse